Yannan Shen

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Education

Ph.D. 2012 University of Massachusetts, Amherst, Mathematics

M.S. 2009 University of Massachusetts, Amherst, Applied Mathematics

B.S. 2002 Ocean University of China, Applied Mathematics

Professional Experience

Aug., 2023 Associate Professor, University of Kansas.

Jan., 2020 Assistant Professor, University of Kansas.

Aug., 2016 Assistant Professor, California State University, Northridge.

Sep., 2015 Visiting Assistant Professor, Southern Methodist University.

Sep., 2013 Research Associate, The University of Texas at Dallas.

Sep., 2012 Postdoctoral Fellow, IMA, University of Minnesota.

Research Interests

Applied mathematics, models from physics and engineering, such as optical systems, metamaterials, plasmas and Bose-Einstein condensates. These physical models are described by differential equations such as the nonlinear Schrödinger equation, complex Ginzburg Landau equation, short pulse equation. My research mainly involves existence, stability and dynamics of solitary wave solutions. Methods employed include asymptotics, variational approximations, rigorous analysis, numerical analysis, as well as scientific computing.

Publications

23. H. Cai, G. Chen, Y. Shen, "Lipschitz optimal transport metric for a wave system modeling nematic liquid crystals", *submitted to SIAM Math Anal.*.

22. H. Cai, G. Chen, and Y. Shen, "A Finsler type Lipschitz optimal transport metric for a quasilinear wave equation", *J. Diff. Eq.* **356** *289-335 (2023).*

21. G. Chen, Y. Shen, S. Zhu, "Existence and regularity for global weak solutions to the λ-family water wave equations", *Quart. Appl. Math.* **81** *(2023), 751-776.*

20. R. Parker, Y. Shen, A. Aceves, J. Zweck, "Spatiotemporal dynamics in a twisted, circular waveguide array", *Stud. Appl. Math.*, **149**, 537 (2022).

19. H. Cai, G. Chen, Y. Du, Y. Shen, "Uniqueness of conservative solutions to a one-dimensional general quasilinear wave equation through variational principle", *J. Math. Phys.* **63**, 021508 (2022).

18. J. Zweck, Y. Chen, M. J. Goeckner and Y. Shen, "Spectral computation of low probability tails for the homogeneous Boltzmann equation", *Applied Numerical Mathematics,* **162**, 301-317 (2021).

17. H. Cai, G. Chen, R. Chen and Y. Shen, "Lipschitz metric for the Novikov equation", *Arch Rational Mech Anal*, **229**, 1091 (2018).

16. Y. Shen, P.G. Kevrekidis, G.P. Veldes, D.J. Frantzeskakis, D. DiMarzio, X. Lan, and V. Radisic "From Solitons to Rogue Waves in Nonlinear Left-Handed Metamaterials", *Phys. Rev. E.*, **95**, 032223 (2017).

15. H. Cai, G. Chen, Y. Shen, Z. Tan, "Generic Regularity and Lipschitz Metric for the Hunter–Saxton type equations", *J. Differential Equations 262, 1023-1063 (2017)*

14. H. Cai, G. Chen, Y. Shen, "Lipschitz metric for conservative solutions of the two-component Camassa-Holm system", *Z. Angew. Math. Phys.* , **68**, 5 (2017).

13. C. Castro-Castro, Y. Shen, G. Srinivasan, A. Aceves and P.G. Kevrekidis, "Light dynamics in nonlinear trimers and twisted multicore fibers", *J. Nonlinear Optic. Phys. Mat.* , **25** , 1650042 (2016).

12. Y. Shen, P.G. Kevrekidis, G. Srinivasan, and A. Aceves, "Existence, Stability and Dynamics of Discrete Solitary Waves in a Binary Waveguide Array", *J. Phys. A: Math. Theor.*, **49**, 295205 (2016).

11. Y. Shen, J. Zweck, S. Wang, and C. R. Menyuk, "Spectra of Short Pulse Solutions of the Cubic-Quintic Complex Ginzburg Landau Equation near Zero Dispersion", *Studies in Applied Mathematics*, **137**, 238 (2016).

10. G. Chen, Y. Shen, "Existence and regularity of solutions in nonlinear wave equations", *Disc. Contin. Dyn. Syst., Ser. A*, **35**, 3327 (2015).

9. Y. Shen, P. G. Kevrekidis, S. Sen, A. Hoffman, "Characterizing traveling-wave collisions in granular chains starting from integrable limits: The case of the Korteweg-de Vries equation and the Toda lattice", *Phys. Rev. E*, **90** (2), 022905 (2014) .

8. Y. Shen, T. P. Horikis, P. G. Kevrekidis, D. J. Frantzeskakis, "Traveling waves of the regularized short pulse equation", *J. Phys. A: Math. Theor.*, **47**, 315204 (2014).

7. Y. Shen, P. G. Kevrekidis, N. Whitaker, N. I. Karachalios, D. J. Frantzeskakis, "Finite-temperature dynamics of matter-wave dark solitons in linear and periodic potentials: an example of an anti-damped Josephson junction", *Phys. Rev. A*, **86**, 033616 (2012).

6. Y. Shen, N. Whitaker, P. G. Kevrekidis, N. L. Tsitsas, D. J. Frantzeskakis, "Ultrashort pulses and short-pulse equations in (2+1)-dimensions", *Phys. Rev. A*, **86**, 023841 (2012).

5. Y. Shen, P. G. Kevrekidis, N. Whitaker, Boris A. Malomed, "Spatial solitons under competing linear and nonlinear diffractions", *Phys. Rev. E*, **85**, 026606 (2012).

4. L. Q. English, S. G. Wheeler, Y. Shen, G. P. Veldes, N. Whitaker, P. G. Kevrekidis, D. J. Frantzeskakis, "Backwards-wave propagation and discrete solitons in a left-handed electrical lattice", *Phys. Lett. A*, **375**, 1242 (2011).

3. A. Stefanov, Y. Shen, P. G. Kevrekidis, "Well-posedness and small data scattering for the generalized Ostrovsky equation", *J. Diff. Eq.*, **249**, 2600 (2010).

2. Y. Shen, F. Williams, N. Whitaker, P. G. Kevrekidis, A. Saxena and D. J. Frantzeskakis, "On some single-hump solutions of the short-pulse equation and their periodic generalizations", *Phys. Lett. A* , **374**, 2964 (2010).

1. N. L. Tsitsas, T. P. Horikis, Y. Shen, P. G. Kevrekidis, N. Whitaker, D. J. Frantzeskakis, "Short pulse equations and localized structures in frequency band gaps of nonlinear metamaterials", *Phys. Lett. A*, **374**, 1384 (2010) .

Grant

2024-2026 American Institute of Mathematics, SQuaRE, "Investigations of the Euler and Relativistic Euler Systems".

Group members: Christopher Alexander (University College, London), Manas Bhatnagar (U Mass), Geng Chen (U Kansas), Yannan Shen (U Kansas), Blake Temple (UC Davis), Robin Young (U Mass).

2022-2025 Regularity and stability for solutions of quasilinear wave type models with singularities, NSF-DMS, PI, $243,759.

2021-2023 New Faculty General Research Fund, University of Kansas, PI, $18,932.

2017-2018 Waves on Nonlinear Transmission Lattice, Northrop Grumman, PI, $30,000.